RESEARCH AND PRODUCTION COMPANY
DIAGNOSTIC SYSTEMS Ltd.

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CE

IVD **For *In vitro* Diagnostic Use**

INSTRUCTIONS FOR USE
abia Cortisol
Enzyme immunoassay for the quantitative determination of cortisol concentration in human serum

This Package Insert provides information for Professional Use of the kit.
The kit contains sufficient reagents for 96 assays (one breakable wells) including controls; partial use of the kit is possible, can be used for manual protocol.

I. INTENDED USE

The abia Cortisol kit is intended for the quantitative determination of Cortisol concentration in human serum by a microplate enzyme immunoassay.

This kit is for diagnostic use by a trained laboratory professional and will not be sold to the general public. All the reagents are for professional *in vitro* diagnostic use only.

The results of this or any other diagnostic assay should be used and interpreted only in the context of the overall clinical picture.

II. INTRODUCTION

Cortisol (hydrocortisone, compound F) is the main corticosteroid secreted in humans by the adrenal cortex. This steroid hormone has a molecular weight of 363.5. In most physiological conditions, only about 10% of plasma cortisol circulates unbound from transcortin and albumin. Among the products of the human adrenal cortex, only cortisol is involved in the regulation of ACTH secretion. As the level of free (non-protein bound) cortisol in blood rises, the release of ACTH is inhibited by the negative feedback effect. Conversely, if cortisol levels are subnormal, the negative feedback decreases, ACTH levels rise, and the adrenal cortex secretes cortisol until normal blood levels are restored. The release of ACTH is under control of hypothalamic corticotrophin-releasing hormone (CRH); the negative feedback system involving cortisol has been identified at both hypothalamic and pituitary levels. Normally during the day there is a fluctuation of cortisol achieving the highest level in the morning and the lowest in the night. Useful information is given when cortisol measurement is done in samples withdrawn at a fixed hour (8.00 a.m.). The main biological effects of cortisol are: promotion of gluconeogenesis, deposition of liver glycogen, increase in blood glucose concentration when the carbohydrate utilization is reduced, effect on fat metabolism and anti-inflammatory action.

Cortisol measurement is a powerful tool for the evaluation of suspected abnormalities in glucocorticoid production: Cushing's Syndrome (hypercortisolism), Addison's disease or secondary adrenal insufficiency (hypocortisolism). In many cases, it is necessary to perform dynamic tests (suppression or stimulation) in order to localize the defect at one of the three main levels (i.e. adrenal, pituitary, hypothalamus).

III. PRINCIPLE OF THE TEST

The abia Cortisol is a one-step immunoasay to determine the presence of Cortisol in human serum using competitive microplate enzyme immunoassay.

Plates are coated with anti-cortisol antibodies. Serum reference, patient specimens, or control is first added to microplate well. Enzyme-Cortisol conjugate is added. Cortisol present in the sample competes with Enzyme-Cortisol conjugate for binding with anti-cortisol coated microplate to form an antigen-antibody complex.

Unbound conjugate is removed by washing. The enzyme activity in the antibody-bound fraction is inversely proportional to the native cortisol concentration. The enzyme activity is revealed by a color change in TMB-Substrate solution.

IV. CONTENT OF THE KIT abia Cortisol

Table 1

LABEL	NATURE OF THE REAGENTS	PRESENTATION
Anti-Cortisol-coated microtiter wells	Polystyrene stripped 96-well plate (breakable wells) coated with monoclonal antibodies to Cortisol. Once opened, microtiter wells should be stored at 2-8 °C until expiration date of the kit.	1 plate
Conjugate	Cortisol, conjugated to horseradish peroxidase. Transparent or opalescent pink color liquid. Preserving agent: 0.1% ProClin 300, 0.004% gentamycin sulfate. Once opened, Conjugate should be used within two months. Store at 2-8 °C until expiration date in a tightly sealed vial.	1 vial 12.0 ml
Calibrator 0 Calibrator 1 Calibrator 2 Calibrator 3 Calibrator 4 Calibrator 5	Six vials of human serum based reference Calibrators for Cortisol. The Cortisol concentration levels in Calibrators are provided on the labels of vials and in the Certificate of Analysis on a lot-specific basis.* Transparent or opalescent liquids, pale yellow. Preserving agent: 0.1% ProClin 300, 0.1% phenol. Once opened, Calibrators should be used within two months. Store at 2-8 °C until expiration date in a tightly sealed vial.	6 vials 0.5 ml
Control Serum	Control, human serum based. Cortisol concentration level in Serum is provided on the vial label and in the Certificate of Analysis on a lot-specific basis. Transparent or opalescent liquid, pale yellow. Preserving agent: 0.1% ProClin 300, 0.1% phenol. Once opened, Control Serum should be used within two months. Store at 2-8 °C until expiration date in a tightly sealed vial.	1 vial 0.5 ml
Washing Solution (concentrated 25-fold)	Phosphate-saline solution (pH 7.4-7.7). Transparent or slightly opalescent liquid, colorless, or pale yellow, sediment may form that dissolves completely at 35-39 °C and shaking. Once opened, Washing Solution should be stored at 2-8 °C until expiration date in a tightly sealed vial.	1 vial 50.0 ml
TMB-Substrate	Tetramethylbenzidine (0.03%) in citric acid buffer, containing H_2O_2 (0.01%). Transparent colorless liquid. Once opened, TMB-Substrate should be used within two months. Store at 2-8 °C until expiration date in a tightly sealed vial.	1 vial 14.0 ml
Stopping Reagent	0.2M sulfuric acid solution. Transparent colorless liquid. Once opened, Stopping Reagent should be stored at 2-8 °C until expiration date in a tightly sealed vial.	1 vial 25.0 ml

* Nominal values of Calibrators are traceable to a collection of serum samples certified using a chemiluminescence immunoassay in accordance with EN ISO 17511: 2021 In vitro diagnostic medical devices - Requirements for establishing metrological traceability of values assigned to calibrators, trueness control materials and human samples.

Additionally the following may be included in the delivery set:

- a lid for polystyrene 96-well plates or a protective film for EIA plates;
- disposable tips;
- a plastic dish for liquid reagents;
- polyethylene bag with a Zip-Lock.

V. PRECAUTIONS

The reliability of the results depends on correct implementation of the following requirements:

- The temperature in the lab should be 18-24 °C.
- Inspect the contents of the box: check the vials and labels integrity. In case of label loss or labels/vials damage, vials should be disposed and **kit cannot be used**.
- Do not use expired reagents.
- Do not mix reagents from different lots within a given test run.
- Carefully reconstitute the reagents avoiding any contamination.
- Do not carry out the test in the presence of reactive vapors (acid, alkaline, aldehyde vapors) or dust that could alter the enzyme activity of the conjugates.
- Use glassware thoroughly washed and rinsed with distilled or deionized water or preferably, disposable material.
- Do not allow the microplate to dry between the end of the washing operation and the reagent distribution.
- The enzyme reaction is very sensitive to metal ions. Consequently, do not allow any metal element to come into contact with the various conjugate or substrate solutions.
- Use a new distribution tip for each sample.
- Do not reuse protective films for EIA plates.
- Well washing is a critical step in this procedure: respect the recommended number of washing cycles and make sure that all wells are completely filled and then completely emptied. Incorrect washing may lead to inaccurate results.
- Never use the same container to distribute conjugate and other solutions.
- Check the pipettes and other equipment for accuracy and correct operation.
- Do not change the assay's procedure.
- Use distilled or deionized water.
- Avoid exposure of the reagents to excessive heat or sunlight during storage and incubation.
- Once the assay has been started, all subsequent steps should be performed without interruption.

VI. HEALTH AND SAFETY INSTRUCTIONS

- All reagents included in the kit are intended for "*in vitro* diagnostic use".
- Human origin material used in the preparation of Control Serum and Calibrators has been tested and found negative for HBsAg, antibodies to hepatitis C virus and antibodies to human immunodeficiency virus (HIV-1 and HIV-2).
- Certain reagents contain biological material of animal origin.
- Because no known test method can offer complete assurance that infections agents are absent, handle reagents and patients samples as if capable of transmitting infections disease.

- Do not eat, drink, smoke, or apply cosmetics where immunodiagnostic materials are being handled.
- Any equipment directly in contact with specimens and reagents as well as washing solutions should be considered as contaminated products and treated as such.
- Wear lab coats and disposable gloves when handling reagents and samples and thoroughly wash your hands after handling them.
- Avoid spilling samples or solutions containing samples.
- Avoid any contact of the TMB-Substrate and the Stopping Reagent with the skin and mucosa.
- Provide adequate ventilation.
- All materials contacted with specimens or reagents, including liquid and solid wastes, should be inactivated by validated procedures (autoclaving or chemical treatment) and disposed in accordance with applicable local law regulations.

Warning!

Conjugate, Calibrators 0-5, Control Serum contain ProClin 300.

H317: May cause an allergic skin reaction.
P261: Avoid breathing vapours.
P280: Wear protective gloves/protective clothing/eye protection/face protection.
P302 + P352 IF ON SKIN: Wash with plenty of water.
P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.

Danger!

Stopping Reagent contains 0.2M sulfuric acid.

H314 Causes severe skin burns and eye damage.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P303 + P361 + P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310 Immediately call a POISON CENTER or doctor/ physician.

VII. MATERIALS AND EQUIPMENT REQUIRED BUT NOT PROVIDED WITH THE KIT:

- Distilled or deionized water.
- Automatic or semiautomatic, adjustable or preset single-channel and multi-channel pipettes with a changeable volume for a set of liquids.
- Disposable pipette tips.
- Automatic microplate washer.
- Microplate reader equipped with 450 nm filter.
- Open type automated analyzer with 450 nm filter (for automated procedure).
- Laboratory clock.

VIII. COLLECTION AND HANDLING OF SPECIMENS

Blood samples should be collected according to the current practices. Serum only may be used. Separate serum as soon as possible to avoid any hemolysis. Extensive hemolysis may affect test performance. Specimens with observable particulate matter should be clarified by centrifugation prior to testing. Suspended fibrin particles or aggregates may yield falsely positive results. Do not heat the samples. For accurate comparison to established normal values, a fasting morning serum sample should be obtained.

Store/transport the samples in accordance with the current regulatory documentation. If samples are to be stored/transported for a longer period of time, they must be frozen at or below -20 °C. Avoid repeated freeze/thaw cycles. Samples that have been frozen and defrosted more than 1 time cannot be used. Samples with expressed bacterial growing, hemolysis, hyperlipidemia and which were preserved by sodium azide or thimerosal must not be analyzed.

IX. PREPARATION OF THE REAGENTS

1. Ready to use reagents:

- **Anti-Cortisol-coated microtiter wells.** Each 12-strips plate (breakable wells) is wrapped in a sealed foil-lined bag. Open the bag and remove the plate. Select the number of strips/wells required for the assay. Place the unused strips/wells back into the foil-lined bag; reseal the foil-lined bag in a Zip-Lock plastic bag. Do not remove desiccant.
- **Calibrators 0-5;**
- **Control Serum;**
- **Conjugate;**
- **TMB-Substrate;**
- **Stopping Reagent.**

2. Reagents to prepare:

- **Working Washing Solution**. Thoroughly shake Washing Solution concentrate. To make Working Washing Solution take required amount of concentrate and mix with distilled or deionized water (1:24 ratio) in a separate vial. The prepared Working Washing Solution is stable for 14 days at 18-24 °C or for 28 days at 2-8 °C.

X. TEST PROCEDURE

Note: Before use, allow reagents to reach room temperature for 30 min.

1. To the wells add 25 µl of Calibrators and Control Serum in duplicate.

2. To the rest of the wells, add 25 µl of samples in duplicate. Pipetting of samples should not extend beyond ten (10) minutes.

3. Add 100 µl of Conjugate to all wells.

4. Swirl the microplate gently for 30 seconds after adding of samples and Conjugate to mix, cover the strips with a lid or a protective film and incubate for 60 minutes at room temperature (here 20-25 °C).

5. Aspirate the contents of the wells into the container with disinfecting solution. Wash the wells 5 times with 300 µl of Working Washing Solution per well and remove Working Washing Solution using a washer into the container with disinfecting solution. Tap the plate firmly against absorbance paper to ensure that it is dry – the residual volume must be lower than 10 µl (the use of a washer is recommended). Do not allow the microplate to dry between the end of the washing operation and the reagent distribution.

6. Pipette 100 µl of TMB-Substrate into each well.

7. Incubate for 20-30 minutes at room temperature in the dark.

8. Add 150 µl of Stopping Reagent into each well. Gently mix for 5-10 seconds.

9. Read the absorbance on the microplate reader at 450 nm within 20 minutes after stopping reaction.

Scheme of the assay is represented in Annex.

Spectrophotometric verification of reagent pipetting

The presence of Conjugate + sample in the well can be verified by automatic reading at 540 (550) nm. Each well containing sample and Conjugate must have an OD higher than 0.500.

10. Automated analyzers

Validated test protocols and dilution tables of reagent working solutions for different EIA-analyzers can be obtained from the manufacturer upon request (see section XIV). For the instrumentation without established validated protocol follow the section "TEST PROCEDURE" and ensure all requirements described in the section "PRECAUTIONS" are fulfilled. All protocols for automated analyzers must be fully validated before use.

When preparing working reagent solutions for automated EIA procedure, it is necessary to consider "dead" volume of vials and containers used for loading working solutions in the EIA analyzer.

XI. CALCULATION OF RESULTS

1. Calculate the mean optical density of each Calibrator duplicate.
2. Draw a calibration curve on graph paper with the mean optical densities on Y axis and the calibrator concentration on the X axis.
3. Calculate the mean optical density values for each specimen.
4. Read the value of Cortisol concentration in nmol/l in the unknowns directly off the calibration curve. If immunoassay software is being used, a 4-parameter curve is recommended.

Typical Tabulated Data

Calibrator	OD1	OD2	Mean OD	Value (nmol/l)
0	2.827	2.847	2.837	0
1	2.472	2.561	2.517	15
2	1.549	1.584	1.567	90
3	0.538	0.559	0.549	400
4	0.286	0.279	0.283	800
5	0.143	0.152	0.148	1750
Unknown	**0.532**	**0.515**	**0.524**	**418**

This data is for the purpose of illustration only, and should not be used to calculate unknowns. Each user should obtain his or her own data and standard curve.

Test Validation

For the test to be valid the following criteria must be met. If these criteria are not met the test should be considered invalid and should be repeated.

1. The absorbance (OD) of **Calibrator 0** should not be less than 1.3.
2. Calculated Value of **Control Serum** should be within established range.

XII. PERFORMANCE CHARACTERISTICS OF abia Cortisol

1. Assay Dynamic Range

The range of the assay is between 0-1800 nmol/l.

2. Analytical sensitivity

The lower detection limit is 5 nmol/l. The sensitivity was calculated by determining the variability of the 0 nmol/l serum calibrator and using the 2 SD (95% certainty) statistics.

3. Specificity (cross reactivity)

The following substances were tested for cross reactivity of the assay:

Substance	Cross reactivity, %
Cortisol	100
Cortisone	0.47
Corticosterone	10.7
Testosterone	0.27
Estradiol	< 0.001
Estriol	< 0.001
Androstendione	0.1
Progesterone	4.6

4. Precision

Intra-assay precision

The within assay variability is shown below:

Sample	n	Mean, nmol/l	SD	CV, %
1	8	374	8.752	2.3
2	8	870	39.007	4.5

Inter-Assay precision

The between assay variability is shown below:

Sample	Mean, nmol/l	SD	CV, %
1	373	8.206	2.2
2	868	28.083	3.2

5. Accuracy

The abia Cortisol test system was compared with a Chemiluminescent microparticle immunoassay as a reference test. The total number of specimens was 390. The values ranged from 20 to 893 nmol/l. The least square regression equation and the correlation coefficient were computed for abia Cortisol in comparison with the reference method. The least square regression analysis was y= 0.91(x) + 90.58 with correlation coefficient 0.9.

6. Expected normal Value

It is strongly recommended that each laboratory should determine its own normal and abnormal values.

Group	Value, nmol/l
Before 12-00 p.m.	138-690
After 12-00 p.m.	69-345

Unit Conversion Calculator: nmol/l x 0.362= ng/ml, ng/ml x 2.76 = nmol/l.

XIII. LIMITS OF THE TEST

1. The test must be performed exactly as per the manufacturer's instructions for use. Any modification of the test kit and/or exchange or mixture of any components of different lots from one test kit to another could negatively affect the intended results and validity of the overall test. Such modification and/or exchanges invalidate any claim for replacement.
2. Serum Cortisol values may be depended from sampling time or administration of prednizolone, prednisone and other structurally related corticosteroids.
3. The results obtained with this kit should never be used as the sole basis for clinical diagnosis. Any laboratory result is only a part of the total clinical picture of the patient.

XIV. CONDITIONS OF STORAGE AND TRANSPORTATION

Expiry date is indicated on the packaging.

Keep in dark dry place at 2-8 °C. Freezing is prohibited.

Transportation should be done at 2-8 °C. Transportation at 9-20 °C is allowed not more than during ten (10) days.

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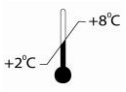
XV. REFERENCES

1. Peters J.R., et al., Clin Edocrinol. 17:583, 1982.
2. Papanicolaou, D.A. et al J. Cli Endocrinol Metab 87(10)4515-4521.
3. Check, J.H., et al, Falsely elevated steroidal assay levels related to heterophile antibodies against various animal species. Gynecol Obstet Invest 40:139-140, 1995.

XVI. EXPLANATION OF SYMBOLS

CE	CE marking (European directive 98/79/CE on in vitro diagnostic medical devices)		Storage temperature limitation
	Manufacturer		Consult Instruction for use
	Date of manufacture CCYY-MM	IVD	For in vitro diagnostic use
	Expiry date CCYY-MM-DD		Sufficient for
LOT	Batch code		Symbol “exclamation mark”
REF	Catalog number	**Warning!**	Signal word
	Fragile, handle with care		Symbol “corrosion”
	Keep away from sunlight	**Danger!**	Signal word
	Keep dry		Top

Annex

Scheme of the assay

1	**Add**	25 µl of Calibrators, Control Serum in duplicates; 25 µl of samples in duplicates
2	**Add**	100 µl of Conjugate into all wells
3	**Mix**	30 seconds
4	**Incubate**	60 min, at 20-25 °C
5	**Wash the plate**	**Working Washing Solution, 300 µl, 5 times**
6	**Add**	100 µl of TMB-Substrate into all wells
7	**Incubate**	20 -30 min, at room temperature in a dark place
8	**Add**	150 µl of Stopping Reagent into all wells
9	**Mix**	5-10 seconds
10	**Read the optical density**	450 nm

nmol/l x 0.362 = ng/ml ng/ml x 2.76 = nmol/l